Why Multiple Solutions Should Not Be Selected

The alternate recommendation section in this Report recommends "the utilization of the location routing number as the routing algorithm for service provider portability" in California, and "the use of . . . alternative triggering mechanisms (e.g. AIN/IN, RTP, etc.)." While it may appear attractive, on first glance, to allow service providers to trigger in any manner they please, granting carriers this "flexibility" will preclude the rapid evolution of a competitive marketplace. There are several reasons why allowing service providers to select multiple triggering options rather than selecting a single permanent database LNP solution will hinder local competition and therefore jeopardize the public interest.[23]

Availability Delayed. The most current publicly available switch vendor software availability dates indicate that RTP switch software will, in most cases, be available later than LRN switch software. Indeed, some switch vendors (e.g., Ericsson, Siemens Stromberg-Carlson) have not indicated any dates for RTP switch software availability. Others, like Nortel, do not currently have plans to develop RTP switch software, but have provided estimates of the earliest possible dates for switch software availability. Given the uncertainty surrounding the availability dates of switch software for RTP, and Pacific Bell's stated unwillingness to implement the LRN solution should it become available before RTP, there is a grave risk that number portability (and therefore significant local competition) will be delayed if service providers are allowed a "choice" in triggering options.

Lack of Level Playing Field. RTP requires that a new service provider continue to rely on the incumbent network, in both a technical and economic sense, for rerouting all calls originating in that network to ported numbers acquired from that network. In contrast, calls to non-ported numbers are routed directly to the serving end office when RTP is used. This characteristic imposes inherent discrimination between service offered to customers who choose to change service providers and those who remain with the incumbent LEC.

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[23]While proponents of the alternative recommendation purport to support location routing number as a common routing algorithm with multiple triggering options, the primary proponent, Pacific Bell, has stated that the only triggering option it actually intends to employ is RTP. Thus, it may be misleading to read the alternate recommendation as calling for a "choice" among a broad array of triggering options.

Non-Uniform Post-Dial Delay. LRN results in equal treatment of calls to ported and non-ported numbers within a portable NPA-NXX. Intraoffice calls will not incur a database query for either ported or non-ported lines. Interoffice calls will involve a database query for both ported and non-ported lines. This characteristic does not create perceptible post-dial delay differences between ported and non-ported numbers. In contrast, post-dial delay associated with RTP affects only ported numbers, thereby affording an unfair competitive advantage to incumbents in retaining customers.

Increased Complexity. Co-existence of multiple solutions imposes additional effort and therefore costs on the part of the telecommunications industry and regulators to develop interface specifications and interoperability standards among the various solutions. It also forces vendors, and quite possibly national carriers (e.g., IECs, PCS providers), to implement multiple solutions, or, at a minimum, to develop the ability to interwork with multiple solutions. In addition, if multiple triggering mechanisms are allowed, vendors will have to focus on developing software for more than one solution. This is likely to cause delay in implementation of a permanent LNP solution.

Increased Cost. The added complexity associated with co-existing multiple solutions or multiple triggering options can only delay the time frames and increase the costs for initial availability of LNP. Moreover, California ratepayers would bear the entire cost of RTP development since no other state which has evaluated RTP is currently planning to deploy it. Additionally, California ratepayers would bear further cost of retrofitting from RTP to location and service portability.

Increased Regulatory Burden. The added complexity associated with multiple solutions, coupled with the inherent differentiation in treatment between ported and non-ported calls when RTP/lm is used, is likely to result in continuing disputes within the industry and protracted litigation. By choosing a single solution for all service providers, the Commission can avoid, or at least minimize, such litigation and oversight.

Conclusion

Thus, the formal recommendation of the majority of the evaluators is that the Commission should order the implementation of LRN (i.e., AIN/IN triggers, external database) for wireline service providers in California.[24] The evaluators joining in this recommendation also urge that the Commission include in any existing or future quality of service review the specification of quality of service standards for the transfer of call processing information between the networks of all California service providers. Furthermore, these evaluators recommend that 1) the Commission's order specify that SS7 database LRN software should be tested between different carriers' networks with each switch type as soon as it is available, 2) the Commission's order include a date certain for the completion of permanent LNP implementation, 3) the implementation completion date be set by the Commission's order to be the end of the second quarter of 1998, and 4) the Commission make it clear in its order that it expects the implementation completion date to be accomplished, that service providers are required to use their best efforts and to cooperate to complete implementation by the required date, and that the Commission will impose penalties for failure or non-cooperation.

The evaluators joining in this recommendation believe that establishing the constraints specified above not only will provide vendors and developers with the certainty and timeline they need in order to complete their tasks in the shortest possible time, but also will provide California telecommunications service providers with the proper incentives to realize the goal: *implementation of permanent LNP throughout California in the shortest reasonable time consistent with the criteria of the mission statement.*

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[24]Local number portability for the wireless companies raises different technical and service related issues which will need to be resolved (see Section 6.4, Page 42).

Recommendation Alternative Number 2

Service Provider Local Number Portability should be implemented in California in a cost effective, reliable, technically efficient and competitively neutral manner.[25]

In balancing the technical, economic, reliability and implementation considerations, the following Task Force evaluators (Contel of California, Contel Cellular, California Department of Consumer Affairs (DCA) and Division of Ratepayer Advocates (DRA),[26] GTE California Incorporated, GTE Mobilnet, Pacific Bell, Pacific Bell Mobile Services, and Roseville Telephone Company) recommend, upon the completion of a successful trial, the use of the location routing number as the standard routing information between service providers. In addition, these parties recommend that the trial include alternative triggering mechanisms (e.g., AIN, RTP, or other competitively neutral triggers available at the time of the trial). There are still numerous outstanding issues which can only be answered as a result of a trial.

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[25] The supporters of this recommendation determined that it was inappropriate to address in this Section the merit or lack of merit of the other recommendation, as such opinions are more properly the subject of comments to the Report.

[26] DCA and DRA concur with this recommendation with the following caveat:

As a result of the participation of the DCA and DRA in the Task Force, the DCA and DRA believe it is in the best interest of all Californians for the Commission to adopt a long-term local number portability solution which is as flexible as possible. A flexible approach serves at least two goals: (1) it allows service providers to adopt the solution which is the most cost-effective in their individual networks; and (2) it accommodates the use of future technological innovations without further action of the Commission.

The DCA and DRA support this recommendation because they believe that it is a workable, yet sufficiently flexible approach which meets both goals.

Some of the parties contend that this approach will delay long-term local number portability. The DCA and DRA believe that long-term local number portability should be implemented as quickly as it is technically and economically feasible to do so. Therefore, in addition to urging the Commission to adopt this recommendation, the DCA and DRA also urge the Commission to take appropriate steps to assure that the adopted approach does not result in an unreasonable delay in implementing long-term local number portability.

In order to assure that there is no unwarranted delay, the DCA and DRA recommend that as soon as appropriate testing of both LRN and RTP are completed, the Task Force and the Commission assess the results of that testing, along with the testing results of any other triggering mechanisms available at that time which both use the location routing number as the routing algorithm, and meet the operating standards established by the Commission. Reassessment of the available triggering mechanisms should include test results, the then currently estimated dates for implementing long-term local number portability using each of the triggering mechanisms, as well as the estimated costs which telecommunications providers would incur in order to implement each triggering mechanism. If the Commission determines that any specific LNP option will unreasonably delay the availability of long-term local number portability, giving due weight to the cost of implementing an alternative solution, then the Commission should order the implementation of another appropriate LNP option as the long-term local number portability mechanism.

Different triggering mechanisms that are compatible with the standard routing information, meet service parameters and industry standards (including, but not limited to acceptable post dial delay) should be considered for deployment. Alternative triggering mechanisms, including alternatives which may be developed in the future, will allow implementation of number portability in the most cost effective and technically efficient manner. This recommendation allows the implementation of the location routing number using AIN/IN triggers (which is effectively AT&T's LRN proposal) as well as the location routing number with alternative triggering mechanisms such as RTP. This compatible framework allows each service provider to select for itself the most cost efficient, flexible and technically efficient solution for its network.

We further recommend that, under normal circumstances, and in the absence of specific contracts allowing otherwise, no call should pass between two local service providers unless it carries sufficient information to terminate the call without additional database queries on the receiving service provider's network.

Restricting service providers to one particular solution is, therefore, inappropriate because it could inconvenience consumers, and could lead to unnecessary expense to service providers and ultimately consumers.
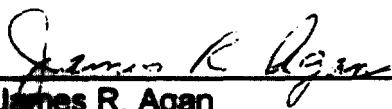
8.0 Requested Action from the Commission

As Section 7 indicates, the Task Force could not reach closure on a single recommendation and, therefore, it is submitting two alternatives. The Task Force respectfully requests that the Commission issue an order in which it chooses the LNP architecture that should proceed to further development and implementation.

Submission of this Report and issuance of the Commission's Order choosing a preferred architecture does not end the Task Force's work. As discussed in Section 5, the Task Force lacks sufficient information at this time to evaluate and make recommendations on a number of implementation issues. In order for the Task Force to continue applying its collective technical expertise to resolve these issues, the Task Force recommends that the Commission: 1) issue an order extending the mandate to the Task Force to include evaluation of, and recommendations to the Commission on, the outstanding implementation issues; 2) require regular reporting to the Commission on the status and progress of the Task Force's efforts; and, 3) provide a vehicle for the resolution of disputes that the Task Force can not resolve.

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a copy of the **California Local Number Portability Task Force Report** on all known parties to **R.95-04-043/I.95-04-044** by mailing a properly addressed copy by first-class mail with postage prepaid to each party named in the official service list.

Executed on February 29, 1996, at San Francisco, California.

James R. Agan

Task Force Participants

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CONTEL Cellular	7090 N. Marks, Suite 104	Fresno	CA	93711
Continental Cablevision	737 29th Street	Boulder	CO	80303
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Counsel for Time Warner	8 California Street, Suite 701	San Francisco	CA	94111
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FiberLink	2433 Carillon Point	Kirkland	WA	98033
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PBMS	4410 Rosewood, Bldg 1, 4th Floor	Pleasanton	CA	94588
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Ponderosa Tel. Co.	P. O. Box 21	Oneals	CA	93645
PSC Communications	1000 Coit Road	Plano	TX	75075
Roseville Telephone	114 Vernon Street	Roseville	CA	95678
Sequoia Equities Inc.	1777 Botelho Drive	Walnut Creek	CA	94596
Sprint	1850 Gateway Drive, 7th Floor	San Mateo	CA	94404
Stratus	4900 Hopyard Rd., Ste 100	Pleasanton	CA	94588
Stromberg Carlson	900 Broken Sound	Beca Raton	FL	33487
TCG	Two Teleport Drive	Staten Island	NY	10311
TRA	P. O. Box 2461	Gig Harbor	WA	98335
US INTELCO	4501 Intelco Logs	Olympia	WA	98507
VarTec Telecomm.	3200 W. Pleasant Run Road	Lancaster	TX	75146
Viacom Cable	5924 Stoneridge Dr., P O Box 13	Pleasanton	CA	94588
VP of Engineering Falcon Cable	10900 Wilshire Blvd., 15th Floor	Los Angeles	CA	90024

Task Force Meetings

Cost Information Submitted by
AT&T
GTE
and Pacific Bell

AT&T Input to CA Economic Assessment Matrix Exercise

Cost Model Logic

➢ **Cost Components Include:**

- Switch Development Cost
    - per switch planning price * number of switches
- Switch Real-Time/Memory
    - No incremental cost identifed
- Interoffice Facilities
    - No incremental cost identified
- 911 Infrastructure Impacts
    - No incremental cost identified
- Operator Services Switch Development
    - per switch planning price * number of operator systems
- SCP Software Development
    - per site planning price * number of mated pairs
- Back Office Systems
    - Not Yet Available

1/25/96

AT&T Input to CA Economic Assessment
Matrix Exercise

NET PRESENT VALUE @ 10% Discount $27,692,460					
	1997	1998	1999	2000	2001
Switch Development Costs	18%	16%	14%	7%	7%
Switch Real-Time/Memory	0%	0%	0%	0%	0%
Signaling Links Required	10%	20%	32%	66%	67%
STPs Required	3%	2%	2%	1%	1%
SCPs Required	64%	57%	49%	24%	23%
Interoffice Facilities	0%	0%	0%	0%	0%
911 Infrastructure Impacts	0%	0%	0%	0%	0%
Operator Services Switch Development	4%	3%	3%	1%	1%
SCP Software Development	1%	1%	1%	1%	1%
Back Office Systems	0%	0%	0%	0%	0%
Per Line COST (NPV/5M Lines)	$ 5.54				

1/25/96

percent of call originations will generate CLASS TCAP messages(100 byte message), an average of 7 ISUP messages per call(25 byte messages), and 2 LNP TCAP per originating call that requires a dip(100 byte messages). By using the call volume data and the SS7 message data, the number of signaling links and SCPs required to support SPNP has been calculated(see attachment for calculations). These calculations resulted in 2.1 A-link pairs per end office and 35 A-link pairs for the SCPs. Since end offices of this size and volume already have at least 2 or more A-links to handle existing SS7 traffic only the cost associated with the LNP percentage of SS7 traffic was included. The number of SCPs required to handle the LNP TCAP query load is 4 mated pairs based on processor capacity(600 TPS) or 5 mated pairs based on a maximum bandwidth of 8 A-links per mated pair. While no additional STPs were required for LNP. The cost model included $5000 per STP A-link connection.

Due to the sensitive nature of pricing information, only a total Net Present Value(NPV) figure of $27,692,460 has been provided. This resulted in a cost per line of $5.54(NPV/5M lines). The NPV has a percentage breakdown by cost element and was distributed across 5 years. In first years of the percentage breakdown the high costs are associated with LNP switching software and SCP databases. In the last couple of years the high percentages are associated with the ongoing cost of signaling links(see attachment). In summary, AT&T believes that the cost to provide SPNP is a small percentage relative to a total network investment and that the benefit to all consumers outweighs the costs.

Local Number Portability Economic Assessment

Kevin Moisan
Pacific Bell

December 15, 1995

PACIFIC ✳ BELL

DRAFT

Task Force Assumptions

1. Only total costs figures will be made public - proprietary information will not be shared.
2. Implementation date for Service Provider Number Portability will be 1/1/97
3. Implementation will take 5 years.
4. Percentage of the network that is SPNP capable as a function of implementation year: year 1 - 40%, year 2 - 30%, year 3 - 20%, year 4 - 5%, and year 5 - 5%
5. Discount rate = 10%
6. 100% of switches are donor switches
7. If switch replacement costs are included in the total cost figure it must be so noted
8. Current SS7 deployment costs are not to be included unless required as a result of SPNP
9. Only 50% of the implementation costs of a required network capability (e.g., AIN or IN) for a given proposal are to be included if the capability is not scheduled to be added.
10. Total cost figures will not include SMS costs
11. Costs are to be determined on a service provider network-wide basis
12. Costs should be determined for individual network items (e.g., DMS 100 and 5ESS) but only the total should be input to this matrix

DRAFT

Pacific Bell Assumptions

- No 911 costs for single number solutions assumed

- SSP-STP A-links engineered @ 0.4 Erlang

- STP-SCP A-links engineered @ 0.3 Erlang

- 10 Digit GTTs were performed at an SCP

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Results

- MCI - Carrier Portability Code:
  - Initial Cost (1997 dollars) = $175,000,000
  - Recurring Cost (1997 dollars) = $29,000,000

- ATT - Location Routing Number:
  - Initial Cost (1997 dollars) = $148,000,000
  - Recurring Cost (1997 dollars) = $26,000,000

- GTE - Non-geographic Number (10% ported traffic):
  - Initial Cost (1997 dollars) = $102,000,000
  - Recurring Cost (1997 dollars) = $29,000,000

To: California Local Number Portability Task Force
From: Jerry Abercrombie, Pacific Bell
Date: January 16, 1996
Subject: Revisions to Pacific Bell's LNP Economic Evaluation (12/15/95)

Attached are two revised view graphs from Pacific Bell's LNP economic evaluation to the California Local Number Portability Task Force meeting on December 15, 1995. Based upon input from our vendors, the cost figures for the Release to Pivot (RTP) solution have been modified and an additional assumption has been listed.

If you have any questions, please call me on (510) 823-1174, or Kevin Moisan on (510) 901-6306. I look forward to seeing you on Thursday, January 18, 1996 at our next Task Force meeting in San Francisco.

Results

- GTE - Non-geographic Number (40% ported traffic):
  - -Initial Cost (1997 dollars) = $111,000,000
  - -Recurring Cost (1997 dollars) = $29,000,000

- Pacific Bell - RTP (10% & 40% ported traffic):
  - -Initial Cost (1997 dollars) = $102,148,000
  - -Recurring Cost (1997 dollars) = $19,014,000 } REVISED

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Pros and Cons of Proposals Submitted by Evaluators

AT&T's COMMENTS ON LNP PROPOSALS - PROs and CONs

RTP/lrn

PROs
1. limits SS7 traffic (i.e. no change to call processing for non-ported lines) for those carriers who utilize RTP
2. single domain numbering plan solution
3. network address format does not adversely affect NANP

CONs
1. inherently differentiates between ported and non-ported lines
2. relies on switch-resident database in donor network for call completion, resulting in inequitable service performance for ported numbers - impacts post-dial delay, reliability (i.e. single point of failure), blocking, and administrative support (i.e. more complex for distributed data)
3. requires implementation of both switch-resident database (i.e. for call completion) and external database (i.e. for 10 digit GTT required by CLASS, LIDB, operator services)

CPC/LRN (two step implementation, CPC first, followed by LRN)

PROs
1. single domain numbering plan solution
2. equal treatment (e.g. performance and reliability) for ported and non-ported lines within a portable NPA-NXX
3. no reliance on donor switch for call completion

CONs
1. adverse impact on NANP resources, during CPC phase
2. requires additional switch routing translations for CPCs
3. does not route unambiguously when NXX is served by more than one end office, during CPC phase

CPC/LRN/RTP

PROs
1. limits SS7 traffic (i.e. no change to call processing for non-ported lines) for those carriers who utilize RTP
2. single domain numbering plan solution

CONs
1. inherently differentiates between ported and non-ported lines
2. relies on switch-resident database in donor network for call completion, resulting in inequitable service performance for ported numbers - impacts post-dial delay, reliability (i.e. single point of failure), blocking, and administrative support (i.e. more complex for distributed data)
3. adverse impact on NANP resources, during CPC phase

Common Routing (essentially specifies only the format of signaling information and routing address to be LRN, but leaves trigger option entirely up to each individual service provider)

This option shares the pros/cons listed above for RTP/lrn. Failure to specify trigger options in a consistent manner imposes additional effort on the part of the telecommunications industry and regulators to develop interface specifications and interoperability standards among the various solutions. It also forces vendors, and quite possibly national carriers (e.g., IECs, PCS providers), to implement multiple solutions, or, at a minimum, to develop the ability to interwork with multiple solutions.

RTP - Pacific Bell (stand alone)

PROs
1. Is alleged by Pacific Bell to be the lowest cost solution within the unique characteristics of Pacific's own network.
2. Minimizes investment in an expansion of a LEC's existing SS7 network.
3. Allows the use of localized end office data bases thereby distributing the processing throughout a carrier's own network. This may minimize the potential, to the extent any in fact significantly exists, for catastrophic complete regional call routing data base failure.

CONs
1. Requires all carriers who interface with Pacific Bell to install RTP which requires the processing of non-ported and ported calls differently and perhaps anti-competitively.
2. Appears, subject to further field tests, to require routing call set up signaling to ported numbers through the network from which the number has been ported, even when that network is not involved in the eventual call path, thereby providing competitive - customer specific - traffic information to that network owner.
3. No switch vendor has plans to develop RTP at this time and Pacific Bell has not commissioned any switch vendor development to date.

NGN - GENERAL TELEPHONE OF CALIFORNIA

PROs
1. Will have the least technical impact on LEC existing networks.
2. Provides the greatest assurance in the current forecast of minimum impact on existing operating and billing systems.
3. Is alleged to have the minimum cost impact on LEC existing networks.

CONs
1. Does not meet the basic criteria for number portability, that is the customer cannot port his/her existing number.
2. It is clear at the outset that NGN will break any originating, terminating, or SS7 call management feature/service that depends on the calling number being the same as the directory number because it is a two-number system.
3. There are no current vendor plans to develop the switch or SS7 capabilities required to support this proposal and GTEC has not commissioned any to date.

CONs

1. Processes RTP network originated calls to ported numbers differently than calls to non-ported numbers and perhaps in an anti-competitive manner.

2. The RTP portion of the RTP/lrn software is forecast to be available at least six months after LRN. It is unclear what extension in time will be required to add the lrn capability to this software and Pacific Bell will not commit to the acceptance of and provision of "lrn" based routing information or LRN across network boundaries in the event that either is available before RTP or RTP/lrn. This allows Pacific Bell to control the timing of the replacement of interim number portability which is a competition tax on Pacific's competitors.

3. Many of the switch vendors have indicated that the same staff which are developing LRN would be used to develop RTP and or RTP/lrn. Introducing RTP/lrn into the development pipeline could significantly impact 3the delivery schedule of LRN and delay number portability.